



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/645,349	08/21/2003	Pieter van Rooyen	1772/16131US02	6747
7590	01/30/2006			EXAMINER MULL, FRED H
Christopher C. Winslade McAndrews, Held & Malloy 500W. Madison Street Suite 3400 Chicago, IL 60661			ART UNIT 3662	PAPER NUMBER
			DATE MAILED: 01/30/2006	

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/645,349	ROOYEN ET AL.	
	Examiner Fred H. Mull	Art Unit 3662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 09 January 2006.
- 2a) This action is **FINAL**.      2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-33 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 09 January 2006 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
  1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Response to Arguments***

1. Applicant's arguments on p. 15, with respect to the rejection(s) of claims 29-33 over Petrus have been fully considered and are persuasive. The rejection(s) of these claims have been withdrawn.
2. Applicant's arguments on p. 15-16, with respect to the rejection(s) of claims 1-9 over Rousphael have been fully considered and are persuasive. The rejection(s) of these claims have been withdrawn.
3. Applicant's arguments on p. 16, with respect to the rejection(s) of claims 10-19 over Rousphael have been fully considered but they are not persuasive.

Applicant argues that Rousphael fails to teach "an array processing module including M signal processing chains, wherein each of the M signal processing chains is coupled to one of the M physical antenna elements, wherein the array processing module is configured to generate N signal response values for the antenna array as a function of the M replicas of the received signal; wherein the N signal response values include at least one virtual antenna response value, wherein N is greater than M".

Applicant fails to provide any rationale for this argument. Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

While Roushafel stresses the procedure of array processing, it is inherent that hardware must be present to perform the procedural steps, specifically, an array processing module including  $M$  signal processing chains, one for each of the  $M$  antenna elements. Roushafel further teaches generating  $N$  signal response values for the antenna array as a function of the  $M$  replicas of the received signal; wherein the  $N$  signal response values include at least one virtual antenna response value, wherein  $N$  is greater than  $M$  (p. 533, final paragraph), where  $N=19$  and  $M=10$ .

4. Applicant's arguments on p. 16, with respect to the rejection(s) of claims 20-28 over Roushafel have been fully considered but they are not persuasive.

Applicant argues that Roushafel fails to teach "limitation of "means for determining a response of each of the  $M$  physical antenna elements to the signal; means for generating, as a function of the responses of the  $M$  physical antenna elements to the signal,  $N$  responses to the signal, respectively associated with  $N$  spatial locations along the antenna array; wherein at least one of the  $N$  spatial locations is not coincident with a location of any of the  $M$  physical antenna elements". Applicant fails to provide any rationale for this argument. Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Roushafel teaches determining a response of each of the  $M$  physical antenna elements to the signal; generating, as a function of the responses of the  $M$  physical antenna elements to the signal,  $N$  responses to the signal, respectively associated with

N spatial locations along the antenna array; wherein at least one of the N spatial locations is not coincident with a location of any of the M physical antenna elements (p. 533, final paragraph), where the 9 virtual antennas are not coincident with the location of any of the 10 physical antenna elements. While Roushafel stresses the procedure of array processing, it is inherent that hardware must be present to perform the procedural steps, specifically, a means for determining, and a means for generating.

5. Applicant's arguments on p. 17, with respect to the rejection(s) of claims 29-33 over Roushafel have been fully considered but they are not persuasive.

Applicant argues that Roushafel fails to teach "an interpolation module coupled to the M signal processing chains, wherein the interpolation module is configured to generate N signal response values for the antenna array as a function of the M replicas of the received signal, wherein N is greater than M". Applicant fails to provide any rationale for this argument. Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Roushafel teaches interpolating to generate N signal response values for the antenna array as a function of the M replicas of the received signal, wherein N is greater than M (p. 533, final paragraph; p. 544, 3<sup>rd</sup> paragraph), where N=19 and M=10. While Roushafel stresses the procedure of array processing, it is inherent that hardware must be present to perform the procedural steps, specifically, an interpolation module for

interpolating, and an array processing module including  $M$  signal processing chains, one for each of the  $M$  antenna elements.

6. Applicant's arguments on p. 17-19, with respect to the rejection(s) of claims 1-9 and 20-29 over Klukas have been fully considered but they are not persuasive.

Applicant argues that Klukas fails to teach not disclose or suggest at least the limitation of "generating, as a function of the responses of the  $M$  physical antenna elements to the signal,  $N$  responses to the signal, respectively associated with  $N$  spatial locations along the antenna array, wherein at least one of the  $N$  spatial locations is not coincident with a location of any of the  $M$  physical antenna elements and is placed at a non-equidistant location between two successive physical antenna elements".

Applicant fails to provide any rationale for this argument. Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Klukas teaches an array with two elements mounted on a vehicle that is moving (p. 343, col. 1). The time 1, the array elements are at positions 1 and 2, at time 2 positions 3 and 4, and at time 3, positions 5 and 6. At time three, these 6 positions are used to act as a 6 element array. Here,  $N=6$ ,  $M=2$ . At time 3, positions 1, 2, 3, and 4 are not coincident with any of the  $M=2$  physical antenna elements. Nor are any of those positions equidistant between the antenna elements at 5 and 6.

7. Applicant's arguments on p. 18, with respect to the rejection(s) of claims 10-19 over Klukas have been fully considered but they are not persuasive.

Applicant argues that Klukas fails to teach not disclose or suggest at least the limitation of “an array processing module including  $M$  signal processing chains, wherein each of the  $M$  signal processing chains is coupled to one of the  $M$  physical antenna elements, wherein the array processing module is configured to generate  $N$  signal response values for the antenna array as a function of the  $M$  replicas of the received signal; wherein the  $N$  signal response values include at least one virtual antenna response value, wherein  $N$  is greater than  $M$ ”. Applicant fails to provide any rationale for this argument. Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Klukas teaches an array with two elements mounted on a vehicle that is moving (p. 343, col. 1). The time 1, the array elements are at positions 1 and 2, at time 2 positions 3 and 4, and at time 3, positions 5 and 6. At time three, these 6 positions are used to act as a 6 element array. Here,  $N=6$ ,  $M=2$ . At time 3, positions 1, 2, 3, and 4 are not coincident with any of the  $M=2$  physical antenna elements, and are hence “virtual antennas”. Further, while Klukas stresses the procedure of array processing, it is inherent that hardware must be present to perform the procedural steps, specifically, an array processing module including  $M$  signal processing chains, one for each of the  $M$  antenna elements.

8. Applicant's arguments on p. 19, with respect to the rejection(s) of claims 29-33 over Klukas have been fully considered and are persuasive. The rejection(s) of these claims have been withdrawn.

9. Applicant's arguments on p. 19-21, with respect to the rejection(s) of claims 1-33 over Kivinen have been fully considered and are persuasive. The rejection(s) of these claims have been withdrawn.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 10-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Roushanel.

In regard to claims 10-11, 14, 16-18, 20, and 23-27, Roushanel discloses: receiving M replicas of the signal, each of the M replicas being received by one of a corresponding M physical antenna elements of the antenna array; determining M responses of the M physical antenna elements to the signal, each of the M responses corresponding to one of the M physical antenna elements; and generating, as a function of the responses of the M physical antenna elements to the signal, N responses to the signal, respectively associated with N spatial locations along the antenna array, wherein at least one of the N spatial locations is not coincident

with a location of any of the M physical antenna elements (p. 531, section I, 2<sup>nd</sup> ¶; p. 533, final ¶).

In regard to claims 15, and 21 Roushaf further discloses N-M responses of the N responses are associated with virtual antenna elements located among the physical antenna elements (p. 531, section I, 2<sup>nd</sup> ¶; p. 533, final ¶).

In regard to claims 12-13, and 22, Roushaf further discloses at least one of the N-M responses is generated by interpolating at least two of the M responses (p. 531, section II).

In regard to claims 19, and 28, Roushaf further discloses the signal complies with a communication protocol selected from the group consisting of: orthogonal frequency division multiplexing (OFDM), time division multiple access (TDMA), code division multiple access (CDMA), gaussian minimum shift keying (GMSK), complementary code keying (CCK), quadrature phase shift keying (QPSK), frequency shift keying (FSK), phase shift keying (PSK), and quadrature amplitude modulation (QAM) (p. 531, section I, 1<sup>st</sup> ¶).

In regard to claims 29-33, Roushaf further discloses that N is greater than M (p. 533, final ¶), where M=10 and N=19.

11. Claims 1-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Klukas.

Klukas discloses:

receiving M replicas of the signal, each of the M replicas being received by one of a corresponding M physical antenna elements of the antenna array;

determining M responses of the M physical antenna elements to the signal, each of the M responses corresponding to one of the M physical antenna elements; and generating, as a function of the responses of the M physical antenna elements to the signal, N responses to the signal, respectively associated with N spatial locations along the antenna array, wherein at least one of the N spatial locations is not coincident with a location of any of the M physical antenna elements (p. 342, final ¶ to p. 343, col. 1).

### ***Conclusion***

12. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fred H. Mull whose telephone number is 571-272-6975. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas H. Tarcza can be reached on 571-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Fred H Mull  
Examiner  
Art Unit 3662

fhm

  
THOMAS H. TARCZA  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 3600